

9 (Once Amended)

A beverage dispenser apparatus for dispensing through a nozzle
a preestablished volume of a syrup and a preestablished volume of
a soda to be intermixed within said nozzle, said beverage
5 dispensing apparatus comprising:

a soda inlet for connection to a source of soda under
pressure;

a syrup inlet for connection to a source of syrup;

a syrup section connected to said syrup inlet utilizing a
10 first drive piston, said first drive piston moves to
cause dispensing of said preestablished volume of syrup
into said nozzle, said first drive piston being movable
in both a forward and reverse direction within a syrup
drive piston chamber, said syrup in said preestablished
15 volume to be dispensed during movement of said first
drive piston in said forward direction and also during
movement in said reverse direction;

a soda section utilizing a second drive piston, said second
drive piston moves to cause dispensing of said
20 preestablished volume of soda into said nozzle, said
second drive piston being movable in both said forward
and said reverse direction within a soda drive piston
chamber, soda in said preestablished volume to be
dispensed during movement of said second drive piston in
25 said forward direction and also during movement in said
reverse direction, said soda drive piston chamber being

spaced from said syrup drive piston chamber, wherein said first drive piston is connected to said second drive piston so both said first drive piston and said second drive piston move together in said forward direction and together in said reverse direction; and

a completely liquid driven control located between and connected between the soda inlet and the soda drive piston chamber, and powered by soda pressure through the soda from the soda inlet, the control piston [drive control] having an on state in which soda under pressure is routed to alternate sides of the second drive piston to cause reciprocal motion of the first and second drive pistons, and having an off state in which soda under pressure is routed to prevent movement of the first and second drive pistons.

10 (Once Amended)

The beverage dispensing apparatus of Claim 9 wherein: said control piston comprises first and second slide pistons, the first slide piston being physically contactable and movable by said second drive piston during movement in said forward direction, and the second slide piston being physically contactable by said second drive piston during movement in said reverse direction.

12 (Once Amended)

The beverage dispensing apparatus of Claim 9 wherein the control piston includes:

first and second soda inlet valves for selectively connecting first and second ends, respectively, of the soda drive piston chamber to the soda inlet.

14 (Once Amended)

The beverage dispensing apparatus of Claim 13 wherein the control piston includes:

first and second valves associated with the first and second ends of the soda piston drive cylinder for switching fluid connections in the control piston each time the second drive piston approaches one of the first and second ends.

18 (Once Amended)

The beverage dispensing apparatus of Claim 9 and further comprising:

an on/off control connected to the control piston for determining whether the control piston is in the on state or off state.

Claims 19-26 Allowed

15 25 (Once Amended - Allowed)

A dispensing valve for simultaneously dispensing from a nozzle a predetermined volume of a first liquid and a predetermined volume of a second liquid, the beverage dispensing valve comprising:

5 a valve body having a first inlet for connection to a pressurized source of the first liquid and a second inlet for connection to a source of second liquid;

05
10 a first section of the valve body having a drive piston, the drive piston being reciprocable within a drive piston chamber in a forward direction toward a drive piston chamber first end and in a reverse direction toward a drive piston chamber second end;

15 a second section of the valve body connected to the second liquid inlet having a driven piston, the driven piston being reciprocable within a driven piston chamber between first and second ends thereof respectively and the driven piston chamber having a predetermined volume, the drive piston chamber being spaced from the driven piston chamber and the drive piston connected to the driven piston so that both the drive piston and the driven piston move together in a coordinated manner;

20 a fluid powered shifting system in the valve body for causing the drive piston to reciprocate in the drive piston chamber alternatively in the forward and reverse directions, the fluid powered shifting system including:

25

first and second slide pistons, the first and second
slide pistons reciprocable within the first and
second slide piston chambers respectively and the
first and second slide pistons being physically
connected together so as to be movable in a
coordinated manner, and the first slide piston
being physically contactable and movable by the
drive piston during movement thereof in the forward
direction as the drive piston moves adjacent the
drive piston chamber first end for moving the first
and second pistons to a first shifting piston, and
the second slide piston being physically
contactable and movable by the drive piston during
movement thereof in the reverse direction as the
drive piston moves adjacent the drive piston
chamber second end for moving the first and second
slide pistons to a second shifting position;

a first liquid inlet valve in fluid communication with
the first liquid inlet, the first liquid inlet
valve operable by fluid pressure to a first
position for directing the first fluid through a
first flow channel into the drive piston chamber
first end and for blocking flow of the first liquid
through a second flow channel into the drive piston
chamber second end, and operable by fluid pressure
to a second position for directing the first fluid

through the second flow channel into the drive piston chamber second end and for blocking flow of the first liquid through the first flow channel into the drive piston chamber first end;

5 an outlet flow channel for providing fluid communication from the first and second flow channels to the nozzle;

10 a first fluid control comprising a plurality of first fluid passageways for providing fluid communication of a portion of the first liquid from the first inlet to the first and second slide piston chambers and from the first and second slide pistons chambers to the first liquid inlet valve, so that
15 in the first shifting position first fluid is directed thereby to operate the first liquid inlet valve to the first position thereof whereby the first fluid flows into the first flow channel to the drive piston chamber first end for moving the drive piston in the reverse direction and
20 exhausting first liquid out the drive piston chamber second end from the second flow channel to the outlet flow channel, and so that as the drive piston subsequently contacts the second slide piston the first and second slide pistons are moved
25 to the second shifting position wherein the first liquid is directed thereby to operate the first

5 C 5 liquid inlet valve to the second position thereof
whereby the first liquid flows into the second flow
channel to the drive piston chamber second end for
moving the drive piston in the forward direction
and exhausting first liquid out the drive piston
chamber second through the first flow channel to the
outlet channel whereby the drive piston is caused
to reciprocate in the forward and reverse
directions directing first fluid to the nozzle as a
10 function of the volume of the drive piston chamber.

33 (Once Amended)

15 A beverage dispenser apparatus for dispensing through a nozzle
a preestablished volume of syrup and a preestablished volume of a
soda to be intermixed within said nozzle, said beverage dispensing
apparatus comprising:

20 a valve body;

a syrup inlet for connection to a source of syrup;

a syrup chamber within the valve body, the syrup chamber
having first and second ends;

a syrup piston which is movable in the syrup chamber in a
forward direction toward the first end at the syrup
chamber and in a reverse direction toward the second end
of the syrup chamber;

25 means for connecting the syrup inlet and the first and second
ends of the syrup chamber;

means for connecting the first and second ends of the syrup chamber and the nozzle;

a soda inlet for connection to a source of soda under pressure;

5 a soda chamber within the valve body, the soda chamber having first and second ends;

10 a soda piston which is movable in a forward direction toward the first end of the soda chamber and in a reverse direction toward the second end of the soda chamber, the soda piston being connected to the syrup piston so that the soda and syrup pistons move together in the forward direction and the reverse direction; and

15 a completely liquid driven control piston located between and connected between the soda inlet and the first and second ends of the soda chamber, and powered by soda pressure through the soda from the soda inlet, the control piston having an on state in which soda under pressure is routed alternately to the first and second ends of the soda chamber to cause reciprocal motion of the soda and syrup pistons, and having an off state in which soda under pressure is routed to prevent movement of the soda and syrup pistons.

34 (Once Amended)

25 The beverage dispensing apparatus of claim 33 wherein the control piston comprises:

CC
a first slide piston physically contactable and movable by the
soda piston during movement in a forward direction; and
a second slide piston physically contactable by the soda
piston during movement in the reverse direction.

5

36 (Once Amended)

The beverage dispensing apparatus of Claim 33 wherein the
control piston includes:

10

first and second soda inlet valves for selectively connecting
the first and second ends, respectively, of the soda
chamber to the soda inlet.

37 (Once Amended)

CF
The beverage dispensing apparatus of Claim 36 and further
comprising:

15

first and second soda outlet valves for selectively connecting
the first and second ends, respectively, of the soda
chamber to the nozzle.

20

38 (Once Amended)

The beverage dispensing apparatus of Claim 37 wherein the
control piston includes:

25

first and second valves associated with the first and second
ends of the soda cylinder for switching fluid connections
in the control piston each time the soda piston
approaches one of the first and second ends.

40 (Once Amended)

The beverage dispensing apparatus of Claim 33 and further comprising:

an on/off control connected to the control piston for determining whether the control piston is in the on state or the off state.

5

19 41 (New Claim)

A beverage dispenser apparatus for dispensing through a nozzle
a preestablished volume of a syrup and a preestablished volume of
a soda to be intermixed within said nozzle, said beverage
5 dispensing apparatus comprising:

a soda inlet for connection to a source of soda under
pressure;

a syrup inlet for connection to a source of syrup;

a syrup section connected to said syrup inlet utilizing a
10 first drive piston, said first drive piston moves to
cause dispensing of said preestablished volume of syrup
into said nozzle, said first drive piston being movable
in both a forward and reverse direction within a syrup
drive piston chamber, said syrup in said preestablished
15 volume to be dispensed during movement of said first
drive piston in said forward direction and also during
movement in said reverse direction;

a soda section utilizing a second drive piston, said second
drive piston moves to cause dispensing of said
20 preestablished volume of soda into said nozzle, said
second drive piston being movable in both said forward
and said reverse direction within a soda drive piston
chamber, soda in said preestablished volume to be
dispensed during movement of said second drive piston in
25 said forward direction and also during movement in said
reverse direction, said soda drive piston chamber being

spaced from said syrup drive piston chamber, wherein said first drive piston is connected to said second drive piston so both said first drive piston and said second drive piston move together in said forward direction and together in said reverse direction; and

5 a control piston connected between the soda inlet and the soda drive piston chamber, and powered by soda pressure, said control piston includes first and second slide pistons, the first slide piston being physically contactable and
10 movable by said drive piston during movement in said forward direction, and the second slide piston being physically contactable by said second drive piston during movement in said reverse direction, the control piston having an on state in which soda under pressure is routed to alternate sides of the second drive piston to cause reciprocal motion of the first and second drive pistons, and having an off state in which soda under pressure is routed to prevent movement of the first and second drive pistons.

C9
20 242 (New Claim)

The beverage dispensing apparatus of Claim ¹⁹41 wherein:
25 said first and second slide pistons are physically connected together so as to be movable together in said forward direction and in said reverse direction.

2\43 (New Claim)

A beverage dispenser apparatus for dispensing through a nozzle
a preestablished volume of syrup and a preestablished volume of a
soda to be intermixed within said nozzle, said beverage dispensing
5 apparatus comprising:

a valve body;

a syrup inlet for connection to a source of syrup;

a syrup chamber within he valve body, the syrup chamber
having first and second ends;

10 a syrup piston which is movable in the syrup chamber in a
forward direction toward the first end of the syrup
chamber and in a reverse direction toward the second end
of the syrup chamber;

C9
15 means for connecting the syrup inlet and the first and second
ends of the syrup chamber;

means for connecting the first and second ends of the syrup
chamber and the nozzle;

a soda chamber within the valve body, the soda chamber having
first and second ends;

20 a soda piston which is movable in a forward direction toward
the first end of the soda chamber and in a reverse
direction toward the second end of the soda chamber, the
soda piston being connected to the syrup piston so that
the soda and syrup pistons move together in the forward
25 direction and the reverse direction; and

a control piston connected between the soda inlet and the first and second ends of the soda chamber, and powered by soda pressure, and comprising a first slide piston physically contactable and movable by the soda piston during movement in a forward direction;

a second slide piston physically contactable by the soda piston during movement in the reverse direction, the control piston further having an on state in which soda under pressure is routed alternately to the first and second ends of the soda chamber to cause reciprocal motion of the soda and syrup pistons, and having an off state in which soda under pressure is routed to prevent movement of the soda and syrup pistons.

C9

22 44 (New Claim)

The beverage dispensing apparatus of Claim ²¹43 wherein:
the first and second slide pistons are physically connected together so as to be movable together in said forward direction and in said reverse direction.

23 45 (New Claim)

A dispensing valve for simultaneously dispensing from a nozzle a predetermined volume of first liquid and a predetermine volume of a second liquid, the beverage dispensing valve comprising:

a valve body having a first inlet for connection to a pressurized source of the first liquid and a second inlet for connection to a source of the second liquid;

5 a first section of the valve body having a drive piston, the drive piston being reciprocable within a drive piston chamber in a forward direction toward a drive piston chamber first end and in a reverse direction toward a drive piston chamber second end;

10 a second section of the valve body connected to the second liquid inlet having a driven piston, the driven piston being reciprocable within a driven piston chamber between the first and second ends thereof respectively and the driven piston chamber having a predetermined volume, the drive piston chamber being spaced from the driven piston chamber and the drive piston connected to the driven piston so that both the drive piston and the driven piston move together in a coordinated manner;

C9

15 a fluid powered shifting system in the valve body for causing the drive piston to reciprocate in the drive piston chamber alternatively in the forward and reverse directions, the fluid powered shifting system including: first and second slide pistons, the first and second slide pistons being physically connected together so as to be movable in a coordinated manner, and the first slide piston being physically contactable and movable by

20 the drive piston during movement thereof in the forward direction as the drive piston moves adjacent the drive

25

piston chamber first end for moving the first and second
pistons to a first shifting piston, and the second slide
piston being physically contactable and movable by the
drive piston during movement thereof in the reverse
direction as the drive piston moves adjacent the drive
piston chamber second end for moving the first and second
slide pistons to a second shifting piston;

a first liquid inlet valve in fluid communication with
the first liquid inlet, the first liquid inlet valve
operable by fluid pressure to a first position for
directing the first fluid through a first flow channel
into the drive piston chamber first end and for blocking
flow of the first liquid through a second flow channel
into the drive piston chamber second end, and operable by
fluid pressure to a second position for directing the
first fluid through the second flow channel into the
drive piston chamber second end and for blocking flow of
the first liquid through the first flow channel into the
drive piston chamber first end;

an outlet flow channel for providing fluid communication
from the first and second flow channels to the nozzle;
a first flow channel valve in the first flow channel, the
first flow channel valve connected to the plurality of
first fluid passageways and operable by the pressure of
the first fluid presented thereby, wherein in the first
shifting position of the first and second slide pistons,

the first flow channel valve is operated to a closed position so that the first liquid cannot flow to the outlet channel, and wherein in the second shifting position of the first and second slide pistons, the first valve is operated to an open position in which first liquid in the first flow channel is permitted to flow to the outlet channel; and

a first fluid control comprising a plurality of first fluid passageways for providing fluid communication of a portion of the first liquid from the first inlet to the first and second slide piston chambers and from the first and second slide pistons chambers to the first liquid inlet valve, so that in the first shifting position first fluid is directed thereby to operate the first liquid inlet valve to the first position thereof whereby the first fluid flows into the first flow channel to the drive piston chamber first end for moving the drive piston in the reverse direction and exhausting first liquid out the drive piston chamber second end from the second flow channel to the outlet flow channel, and so that as the drive piston subsequently contacts the second slide piston the first and second slide pistons are moved to the second shifting position wherein the first liquid is directed thereby to operate the first liquid inlet valve to the second position thereof whereby the first liquid flows into the second flow channel to the drive

piston chamber second end for moving the drive piston in the forward direction and exhausting the first liquid out the drive piston chamber second through the first flow channel to the outlet channel whereby the drive piston is caused to reciprocate in the forward and reverse directions directing first fluid to the nozzle as a function of the volume of the drive piston chamber;

5
10
15
C9
a second flow channel valve in the second flow channel, the second valve connected to the plurality of first fluid passageways and operable by the pressure of the first fluid presented thereby, wherein in the first shifting position of the first and second slide pistons, the second valve is operated to an open position so that the first liquid is permitted to flow to the outlet channel, and wherein in the second shifting position of the first and second slide pistons, the second valve is operated to a closed position in which first liquid in the second flow channel cannot flow to the outlet channel; and

20
25
a second fluid flow control comprising a plurality of check valves and a plurality of second fluid passageways providing fluid communication between the second fluid inlet and the first and second ends of the driven piston chamber and providing fluid communication between the first and second ends of the driven piston chamber and the nozzle, for alternately directing the second fluid to and exhausting it from opposite sides of the driven

piston as the driven piston is moved in the forward and reverse directions by the drive piston, whereby the second fluid is dispensed out of the nozzle as a function of the volume of the driven piston chamber.

5

246 (New Claim)

The dispensing valve as defined in Claim ²³45 and further including:

a solenoid valve operable to an on state and an off state, the
solenoid valve interacting with a second plurality of
first fluid passageways, the second plurality of first
fluid passageways fluidly connected to a portion of the
flow of the first liquid at the first liquid inlet and to
the first and second slide pistons, the first and second
valves and the first liquid inlet valve, so that in the
off state equivalent pressure from the first fluid is
applied to the first and second slide pistons, the first
and second valves, and the first fluid inlet valve so
that no movement of the drive piston in the first and
second directions occurs, and so that in the on state
first fluid is not delivered to the first and second
slide pistons and the first fluid inlet valve in an
equivalent manner so that reciprocal motion of the drive
piston in the forward and reverse directions occurs.

10

15

20

25

25 47 (New Claim)

The dispensing valve as defined in Claim ²⁹46 and further including a demand regulator fluidly connected between the second fluid inlet and the check valves so that the second fluid is delivered to the driven piston as demanded thereby.

48 (New Claim)

The dispensing valve as defined in Claim 45 and further including:

Q9
a second fluid flow control system including a plurality of check valves and a plurality of second fluid passageways providing fluid communication between the second fluid inlet, the check valves, and the first and second ends of the driven piston chamber, and fluid communication between the first and second ends of the driven piston chamber and the nozzle, for alternately directing the second fluid to and exhausting it from opposite sides of the driven piston as it is moved in the forward and reverse directions by the drive piston, whereby the second fluid is dispensed out the nozzle as a function of the volume of the driven piston chamber.

a beverage dispenser apparatus for dispensing through a nozzle
a preestablished volume of a syrup and a preestablished volume of
a soda to be intermixed within said nozzle, said beverage
5 dispensing apparatus comprising:

a soda inlet for connection to a source of soda under
pressure;

a syrup inlet for connection to a source of syrup;

a syrup section connected to said syrup inlet utilizing a
10 first drive piston, said first drive piston moves to
cause dispensing of said preestablished volume of syrup
into said nozzle, said first drive piston being movable
in both a forward and reverse direction within a syrup
drive piston chamber, said syrup in said preestablished
15 volume to be dispensed during movement of said first
drive piston in said forward direction and also during
movement in said reverse direction;

a soda section utilizing a second drive piston, said second
drive piston moves to cause dispensing of said
20 preestablished volume of soda into said nozzle, said
second drive piston being movable in both said forward
and said reverse direction within a soda drive piston
chamber, soda in said preestablished volume to be
dispensed during movement of said second drive piston in
25 said forward direction and also during movement in said
reverse direction, said soda drive piston chamber being

generally aligned with but spaced apart⁴ from said syrup drive piston chamber, such that there is an air gap therebetween precluding possibility of soda entering the syrup drive piston chamber or syrup entering the soda drive piston chamber, mechanical coupling means for connecting said first drive piston to said second drive piston so both said first drive piston and said second drive piston move together in said forward direction and together in said reverse direction; and

5 a control piston connected between the soda inlet and the soda drive piston chamber, and powered by soda pressure, the control piston having an on state in which soda under pressure is routed to alternate sides of the second drive piston to cause reciprocal motion of the first and second drive pistons, and having an off state in which soda under pressure is routed to prevent movement of the first and second drive pistons.

50 (New Claim)

20 The beverage dispensing apparatus of Claim 49 wherein:
a control piston includes first and second slide pistons, the first slide piston being physically contactable and movable by said second drive piston during movement in said forward direction, and the second slide piston being physically contactable by said second drive piston during movement in said reverse direction.

51 (New Claim)

The beverage dispensing apparatus of Claim 49 wherein said control piston has a control piston chamber with end positions and having a piston therein and being a floating piston so that it is not biased to either of said end positions when in the off state, said control piston being a completely liquid driven control piston and powered by soda pressure through soda from the soda inlet.

52 (New Claim)

A beverage dispenser apparatus for dispensing through a nozzle a preestablished volume of syrup and a preestablished volume of a soda to be intermixed within said nozzle, said beverage dispensing apparatus comprising:

a valve body;

a syrup inlet for connection to a source of syrup;

a syrup chamber within the valve body, the syrup chamber having first and second ends;


a syrup piston which is movable in the syrup chamber in a forward direction toward the first end of the syrup chamber and in a reverse direction toward the second end of the syrup chamber;

means for connecting the syrup inlet and the first and second ends of the syrup chamber;

means for connecting the first and second ends of the syrup chamber and the nozzle;

a soda chamber within the valve body, the soda chamber having first and second ends;

5 a soda piston which is movable in a forward direction toward the first end of the soda chamber and in a reverse direction toward the second end of the soda chamber, said soda piston drive chamber being spaced apart from the syrup drive piston chamber, such that there is an air gap therebetween precluding possibility of soda entering the syrup drive piston chamber or syrup entering the soda
10 drive piston chamber, the soda piston being connected to the syrup piston so that the soda and syrup pistons move together in the forward direction and the reverse direction; and

 a control piston connected between the soda inlet and the
15 first and second ends of the soda chamber, and powered by soda pressure, the control piston having an on state in which soda under pressure is routed alternately to the first and second ends of the soda chamber to cause reciprocal motion of the soda and syrup pistons, and
20 having an off state in which soda under pressure is routed to prevent movement of the soda and syrup pistons.

53 (New Claim)

25 The beverage dispensing apparatus of Claim 51 wherein said control piston has a control piston chamber with end positions and having a piston therein and being a floating piston so that it is

not biased to either of said end positions when in the off state,
said control piston being a completely liquid driven control
piston and powered by soda pressure through soda from the soda
inlet.

5

54 (New Claim)

A beverage dispenser apparatus for dispensing through a nozzle
a preestablished volume of a syrup and a preestablished volume of
a soda to be intermixed within said nozzle, said beverage
dispensing apparatus comprising:

10

a soda inlet for connection to a source of soda under
pressure;

a syrup inlet for connection to a source of syrup;

a syrup section connected to said syrup inlet utilizing a
first drive piston, said first drive piston moves to
cause dispensing of said preestablished volume of syrup
into said nozzle, said first drive piston being movable
in both a forward and reverse direction within a syrup
drive piston chamber, said syrup in said preestablished
volume to be dispensed during movement of said first
drive piston in said forward direction and also during
movement in said reverse direction;

15

20

a soda section utilizing a second drive piston, said second
drive piston moves to cause dispensing of said
preestablished volume of soda into said nozzle, said
second drive piston being movable in both said forward

25

5 and said reverse direction within a soda drive piston
chamber, soda in said preestablished volume to be
dispensed during movement of said second drive piston in
said forward direction and also during movement in said
reverse direction, said soda drive piston chamber being
spaced from said syrup drive piston chamber, wherein said
first drive piston is connected to said second drive
piston so both said first drive piston and said second
drive piston move together in said forward direction and
10 together in said reverse direction; and

15 a control piston connected between the soda inlet and the soda
drive piston chamber, and powered by soda pressure, the
control piston having a control piston chamber with end
positions and a drive piston therein and also having an
on state in which soda under pressure is routed to
alternate sides of the second drive piston to cause
reciprocal motion of the first and second drive pistons,
and having an off state in which soda under pressure is
routed to prevent movement of the first and second drive
20 pistons, said control piston being a floating piston so
that it is not biased to either end of said end positions
when in the off state.

A beverage dispenser apparatus for dispensing through a nozzle
a preestablished volume of syrup and a preestablished volume of a
soda to be intermixed within said nozzle, said beverage dispensing
apparatus comprising:

a valve body;

a syrup inlet for connection to a source of syrup;

a syrup chamber within the valve body, the syrup chamber
having first and second ends;

a syrup piston which is movable in the syrup chamber in a
forward direction toward the first end of the syrup
chamber and in a reverse direction toward the second end
of the syrup chamber;

means for connecting the syrup inlet and the first and second
ends of the syrup chamber;

means for connecting the first and second ends of the syrup
chamber and the nozzle;

a soda chamber within the valve body, the soda chamber having
first and second ends;

a soda piston which is movable in a forward direction toward
the first end of the soda chamber and in a reverse
direction toward the second end of the soda chamber, the
soda piston being connected to the syrup piston so that
the soda and syrup pistons move together in the forward
direction and the reverse direction;

the soda piston drive chamber being spaced apart from the
syrup drive piston chamber, such that there is an air gap
therebetween precluding possibility of soda entering the
syrup chamber or syrup entering the soda chamber; and
5 a control piston connected between the soda inlet and the
first and second ends of the soda chamber, and powered by
soda pressure, the control piston having an on state in
which soda under pressure is routed alternately to the
first and second ends of the soda chamber to cause
10 reciprocal motion of the soda and syrup pistons, and
having an off state in which soda under pressure is
routed to prevent movement of the soda and syrup pistons.

15

20